

and a database stored in a control system, wherein the control system sets a cathode voltage to a predetermined value, stores a substrate bias voltage value in a database when the substrate electrode is apart from a target by a predetermined distance, and controls the output of the power source such that the output is progressively varied based on bias voltage functions, as recited in independent claim 5.

Miyoshi teaches a method of improving step covering properties and of reducing the internal stress of a film by increasing a bias intensity in the initial thin film forming stage and decreasing it in the final thin film forming stage in bias sputtering (Abstract). Miyoshi teaches more specifically that the bias intensity is increased in the initial thin film forming stage to improve the step coverage and it is decreased in the final flat thin film forming stage to reduce the internal stress, and the bias intensity is controlled by changing the fed power and phase difference "stepwise" (Constitution). Accordingly, Miyoshi merely varies the bias intensity with respect to film thickness, but does not vary the bias voltage with respect to voltage values stored in a database and wherein those voltage values stored in the database are stored with respect to a distance between the target and the electrode, as recited in independent claim 5. Not only does Miyoshi fail to disclose or suggest storing substrate bias voltage values in a database, but Miyoshi also fails to disclose or suggest that these values of varying substrate bias voltages are determined with respect to a predetermined distance between the target and the electrode. Miyoshi merely only discusses varying the bias voltage on the basis of film thickness and not on the basis of distance between the target and the electrode. Thus, Miyoshi fails to disclose this feature of independent claim 5, and accordingly fails to

disclose or suggest each and every feature of independent claim 5, as required by 35 U.S.C. § 102.

For at least these reasons, independent claim 5 is patentable over Miyoshi. Furthermore, claim 6, at least for its dependence on patentable claim 5 and for its further limitation, is also patentable over Miyoshi.

The present invention also claims a bias sputtering film forming process for forming a thin film by applying both voltages of a cathode voltage and a substrate bias voltage, wherein a thin film is formed on a substrate whereon an irregularity is formed in the state wherein only the cathode voltage is applied, and sputtering film forming is performed while progressively varying the substrate bias voltage so that the thickness of the thin film formed is substantially uniform, wherein the progressively varying substrate bias voltage corresponds to stored substrate bias voltage values in a database stored in a control system, as recited in independent claim 1.

Iacoponi teaches a method for forming seed layers in a channel or via by applying a high bias to the material of the seed layer during deposition (Abstract). Iacoponi further teaches that the adhesion/barrier layer is deposited using "conventional deposition techniques, such as physical vapor deposition, chemical vapor deposition, or a combination thereof" (column 5, lines 38-42). However, Iacoponi does not teach applying both a cathode voltage and a substrate bias voltage or that the adhesion/barrier layer is formed in the state where only the cathode voltage is applied since, as discussed above, Iacoponi merely teaches using "conventional deposition techniques." In fact, nowhere in Iacoponi is there any teaching of the possibility of two types of voltages being used, *i.e.*, a cathode voltage and a substrate bias voltage. A

closer observation of Iacoponi reveals that Iacoponi only teaches the existence of a substrate bias sputtering voltage as indicated in, for example, column 5, lines 51-61. Thus, Iacoponi fails to disclose or suggest the feature of applying a cathode voltage, and having a thin film formed in the state where only the cathode voltage is applied, as recited in independent claim 1.

Furthermore, the Office Action admits that Iacoponi fails to disclose or suggest progressively varying the substrate bias voltage that corresponds to stored substrate bias voltage values in a database stored in a control system (Office Action, page 4, line 20 - page 5, line 2) and relies on Ikeda and Miyoshi to cure these deficiencies. More specifically, the Office Action relies on Miyoshi to cure deficiencies in both Iacoponi and Ikeda in disclosing or rendering obvious progressively varying substrate bias voltage that corresponds to stored substrate bias voltage values in a database stored in a control system (Office Action, page 5, lines 13-17). However, as discussed above, and upon a closer observation of Miyoshi, Miyoshi fails to disclose or suggest any database that stores a plurality of substrate bias voltage values.

Additionally, neither Ikeda nor Miyoshi, alone or in combination, cure deficiencies in Iacoponi in disclosing or rendering obvious the above-discussed feature of applying both a cathode voltage and a substrate bias voltage, and forming a thin film on a substrate wherein only the cathode voltage is applied, as recited in independent claim 1.

Mamoru teaches a system and method that prevents disconnection or deterioration in the electromigration resistance of metallic wiring (Problem to be Solved), and fails to cure deficiencies in Iacopone, Ikeda and Miyoshi in disclosing or rendering

obvious the features of claim 2, including the above-discussed features of independent claim 1.

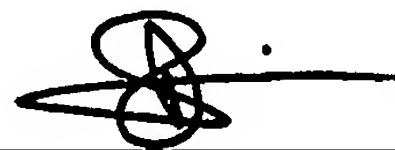
For at least these reasons, independent claim 1 is patentable over all the applied references. Claims 2-4, at least for their dependence on patentable claim 1, and for their added limitations, are also patentable over the combination of the applied references.

For at least these reasons, claims 1-6 are patentable over the applied references. Thus, withdrawal of the rejections of the claims under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) is respectfully requested.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Dkt. No. 029567-00004.**

Respectfully submitted,



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